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# *The* Mutochrome

FOR THE PRODUCTION OF COLOURED DESIGNS

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Modifications of this instrument have been designed for the  
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THEATRICAL STAGE SCENERY  
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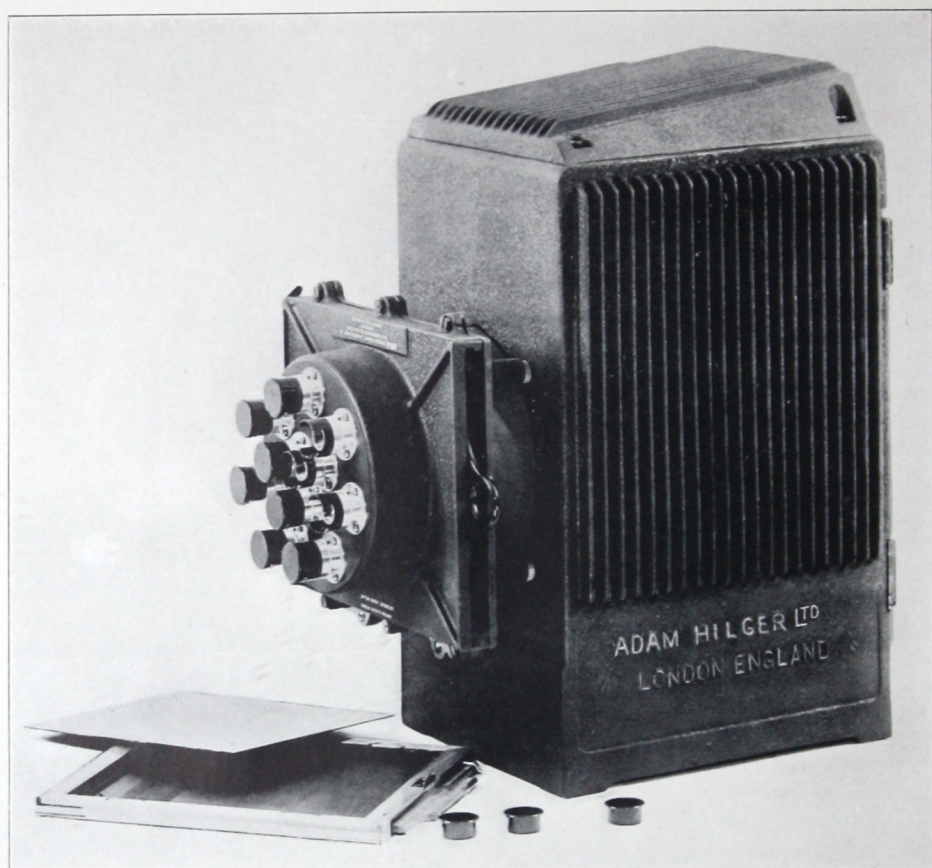
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THE 10-COLOUR MUTOCHROME H85



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# *The* Mutochrome

For the Production of Colour Designs



MAKERS :

ADAM HILGER, LTD.

24 ROCHESTER PLACE, CAMDEN ROAD, LONDON, N.W. 1

*July* 1927



## Patents covering the Mutochrome and its applications

### *British and Foreign Patents*

GREAT BRITAIN	-	-	-	Patent No.	227,072	21st September, 1923.
GREAT BRITAIN	-	-	-	"	233,267	3rd May, 1924.
BELGIUM	-	-	-	"	320,776	20th September, 1924.
ITALY	-	-	-	"	642,179	7th October, 1924.
GERMANY	-	-	-	"	418,618	21st September, 1924.
GERMANY	-	-	-	"	437,391	23rd September, 1924.
FRANCE	-	-	-	"	586,258	20th September, 1924.
SWITZERLAND	-	-	-	"	111,818	19th September, 1924.
SWITZERLAND	-	-	-	"	111,819	19th September, 1924.
JAPAN	-	-	-	"	65,431	23rd May, 1925.
JAPAN	-	-	-	"	65,410	27th May, 1925.
AUSTRIA	-	-	-	"	102,728	15th October, 1925.
AUSTRIA	-	-	-	"	103,606	15th January, 1926.
AUSTRIA	-	-	-	"	101,580	15th June, 1925.
JAPAN	-	-	-	"	66,479	12th August, 1925.

### *Applications for Patents or like exclusive privileges*

UNITED STATES OF AMERICA	Application No.	717,706	4th June, 1924.
GERMANY	"	98,591	20th September, 1924.

**Award.**—The Royal Photographic Society's Medal, 1924.

**References.**—"The Mutochrome," C. F. SMITH, F.R.P.S., *Journ. Sc. Inst.*, Vol. 111, No. 7, April, 1926.

"The Theatre Mutochrome," C. F. SMITH, F.R.P.S., *Proc. Optical Convention*, 1926.



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# I n t r o d u c t i o n

THE secret of the artist's influence on the decorative arts lies to some extent in his knowledge of successful colour combinations, but in many cases, as for instance in the complicated patterns used in textiles and wallpapers, even experienced men fail to foresee the effect.

The trial of possible variations entails much work in the studio, and, in addition, great expense in time and materials in the workshops.

In describing a new instrument or process it is usual to commence by giving a history of previous work done in connection with that class of instrument. Unless one writes of colour, in general, and in theory, very little can be said in introducing the Mutochrome, since this is an entirely new instrument by means of which the decorative artist is enabled to reach his desired objective, viz., an ideal colour scheme. At the same time, the Mutochrome may be worked with ease by those to whom artistic facility has been denied, but who are nevertheless keenly interested in colour. For instance, those responsible for sales can demonstrate and agree ranges of particular patterns in negotiation with important clients, and the workshops can then reproduce the desired results without requiring drawings other than the original black and white tracings. It is not suggested that the artist can be replaced, since he is essential for the production of designs ; but, as in the case of improved machines in other industries, the Mutochrome enables him to employ time to better advantage.

The importance of the Mutochrome in the evolution of colour schemes may be judged from the following leading features :

- (a) The design is *projected* on a screen and may be viewed simultaneously by a number of observers.
- (b) Each element of the design may be *coloured* independently.
- (c) The *brightness* of each element of the design may be *altered* independently.

These features, together with the simplicity of the controls, enable the operator to make variations in the colour composition of a design which would otherwise entail many hours of work on the part of the artist or workman.

Thus in the case of a wallpaper design consisting of yellow flowers, light green leaves, and a grey background, it is possible in a few seconds to try the effect of, say, red flowers, dark green leaves, and a brown background, and then proceed to the infinite number of variations made possible by the alteration of brightness of each of these colours.

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# The Mutochrome

THE principle of the Mutochrome is briefly as follows:—The various elements of a pattern are photographed separately in such a way that they may be projected in combination, under such conditions that each element is entirely under control as regards colour and brightness.

As is shown diagrammatically in Fig. 1, the instrument contains a number of similar optical systems, each of which consists of a lens *a* performing the functions of photography and projection, a condensing lens *b*, and prism *c*. Colour screens *e* are inserted in front of the iris diaphragm *f*, and the photographic plate or negative *g* together with the light source *d* are common to all the systems.

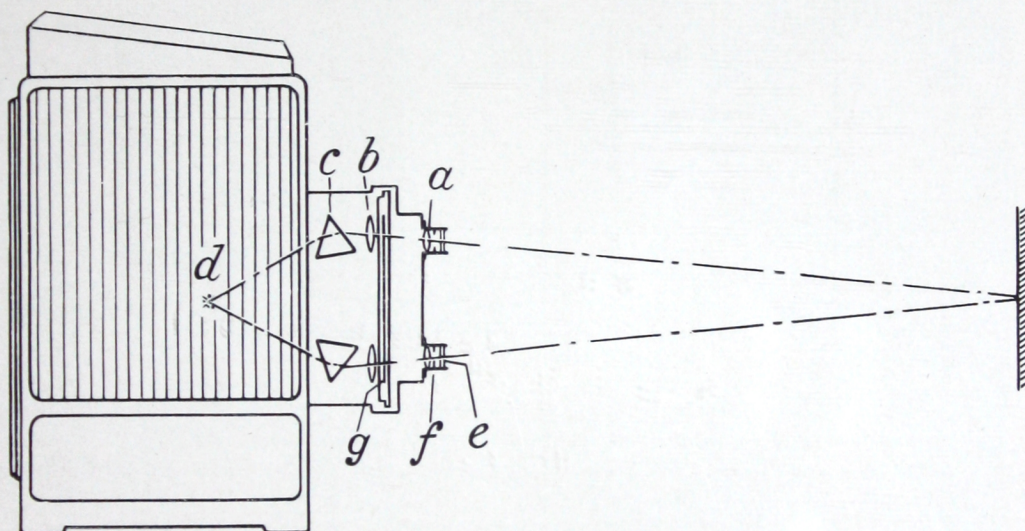


Fig. 1

Diagram of Mutochrome Optical System

In order to project a pattern, each element intended to be projected in one colour is traced or impressed in black on ordinary tracing cloth. In the case of a simple pattern intended to be produced in three colours (shown in Fig. 2A), the corresponding tracings are as in Figs. 2B, 2C and 2D. These are placed in succession on the screen and photographed, each element being photographed by a different lens, but on one and the same plate.

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When the plate is developed three negatives are obtained on it, and after drying it is re-inserted in the instrument. The lighting of the lamp brings the projection system into operation and the three portions of the design are brought into mesh on the screen. Each projected image may be varied in intensity by means of an iris diaphragm *f*, and colour screens *e* enable the desired colour to be obtained.

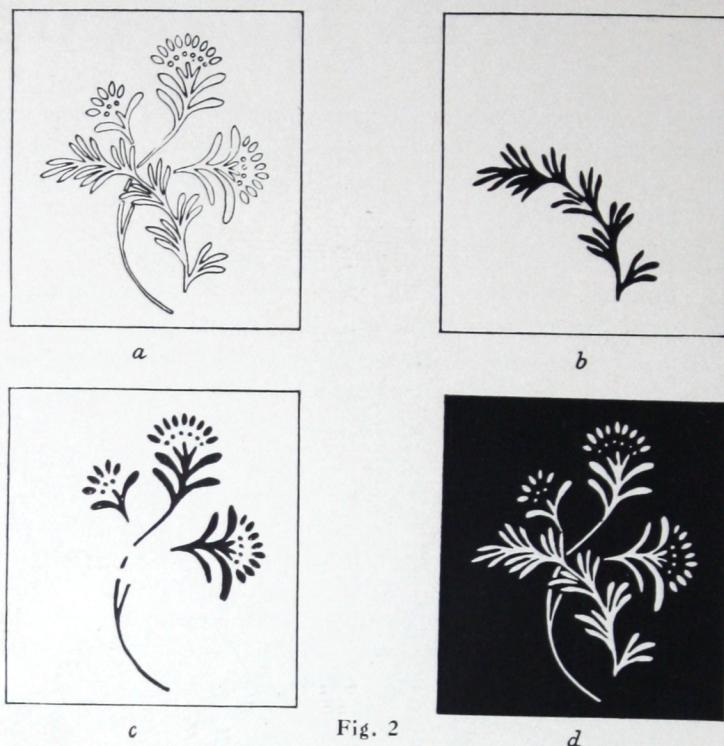


Fig. 2  
A design in three colours with the three impressions  
ready for photography

Fig. 5 is a reproduction of a negative taken on a 7-Colour Mutochrome, in which two of the five elements of the design have been photographed twice. Thus each of these two elements may be coloured singly, or by the addition (or superposition) of two colours on the screen.

The illustrations in colour on pp. 3, 4 and 5, show the result of printing the same set of six colours in three combinations in the selected design.\* These changes can be made rapidly on the Mutochrome with the added advantage that the brightness or shade may also be varied, an effect which the high cost of colour printing does not permit us to demonstrate.

The illustrations in colour on page 6, show the appearance of each of the six elements of the design when projected by the Mutochrome independently of the other elements, together with the complete design, which is the sum of the six elements.

\* In the use of the Mutochrome one is not, of course, restricted to one and the same six colours for each combination.

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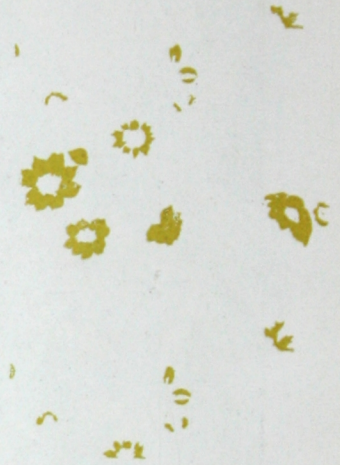


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Fig. 3 shows a seventeen-colour Mutochrome capable of projecting a pattern containing seventeen elements, each of which can be varied in colour and brightness. The source of illumination is a gas-filled lamp provided with a Mangin mirror, and a screen which has the effect of diffusing the filaments into a luminous area with a minimum loss of intensity. The projection lenses are seen on the front of the instrument, in some cases the caps being shown removed. In projection the colour screens are inserted in place of the caps. The iris diaphragms are operated by engraved rings near the base of each lens mount, and are calibrated in percentages of maximum brightness. In photography a dark slide taking a plate  $8\frac{1}{2}'' \times 6\frac{1}{2}''$  is inserted in the opening at the rear of the lens panel. When the negative is ready for projection, it is held in the metal carrier seen in the foreground and placed in the position formerly occupied by the dark slide.

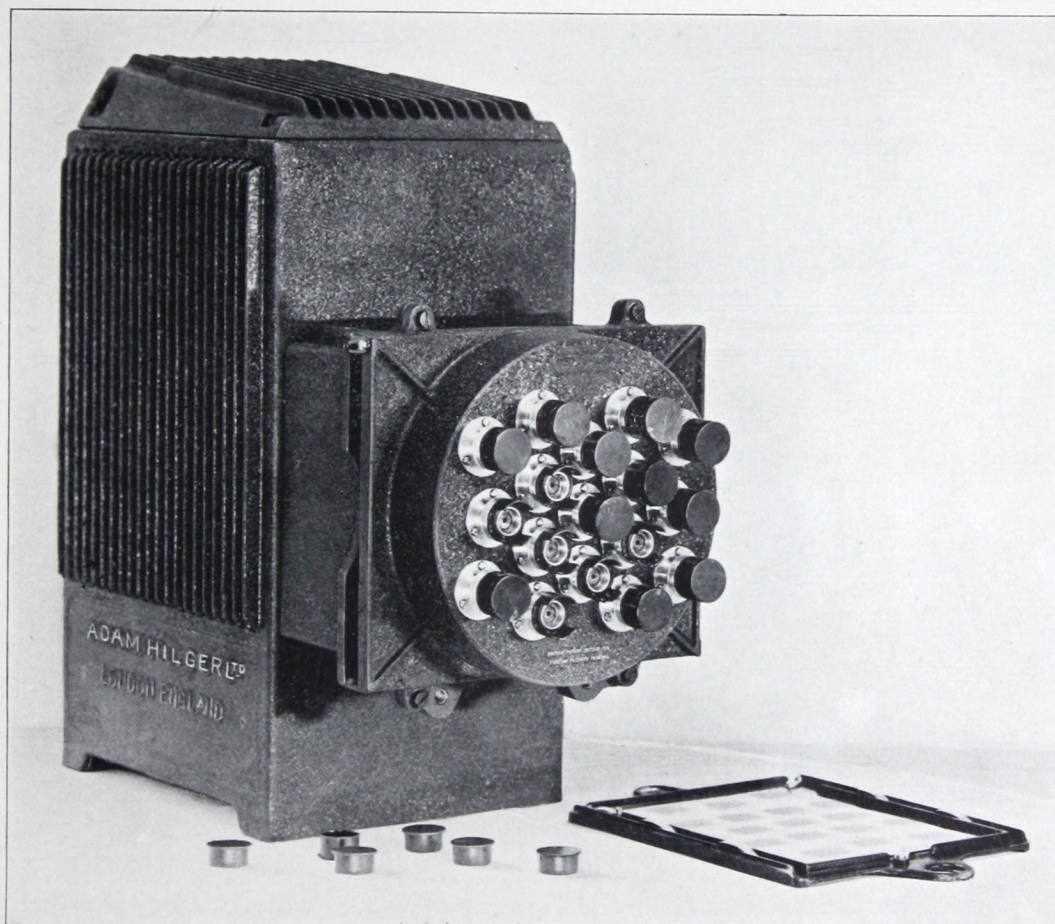


Fig. 3

The 17-Colour Mutochrome (H. 68)

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# Enlarging Lenses

The size of picture normally projected by the instrument is a circle 27 inches diameter or a square of 18 inches side, but the size may be increased to an extent limited only by the decrease of illumination, by the use of a large plano-concave lens placed in front of the lens panel (see Fig. 4). This has the effect of bringing the images into mesh, at the same time maintaining good definition at an increased projection distance. With the plano-concave lens in position, large drawings may be photographed at an increased distance and projected at the same distance, or, with the lens removed, the same negative may be projected at the shorter distance but of diminished size.

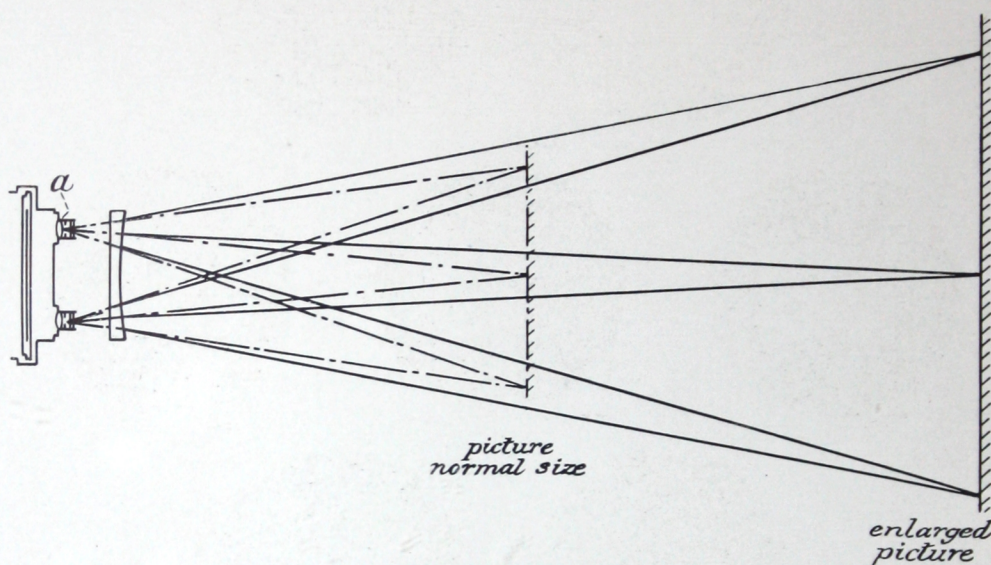


Fig 4

Diagram of Enlarging Lens

Two sizes of Enlarging Lens are listed for each type of Mutochrome, viz., for increasing the normal picture of 18 inches square to 3 feet square or to 5 feet square at increased projection distances of 130 inches or 217 inches respectively, the normal projection distance being 65 inches.

It is evident that the number of colours required at one time in a design will depend very largely on the range normally in use, and this will be found to vary considerably. Four sizes of Mutochromes are therefore made, to project seven colours, ten colours, seventeen colours and twenty-five colours respectively. These are suitable for use by manufacturers of linoleums, textiles, wallpapers and the like. For price list of the Mutochromes and Enlarging Lenses see enclosed leaflet.

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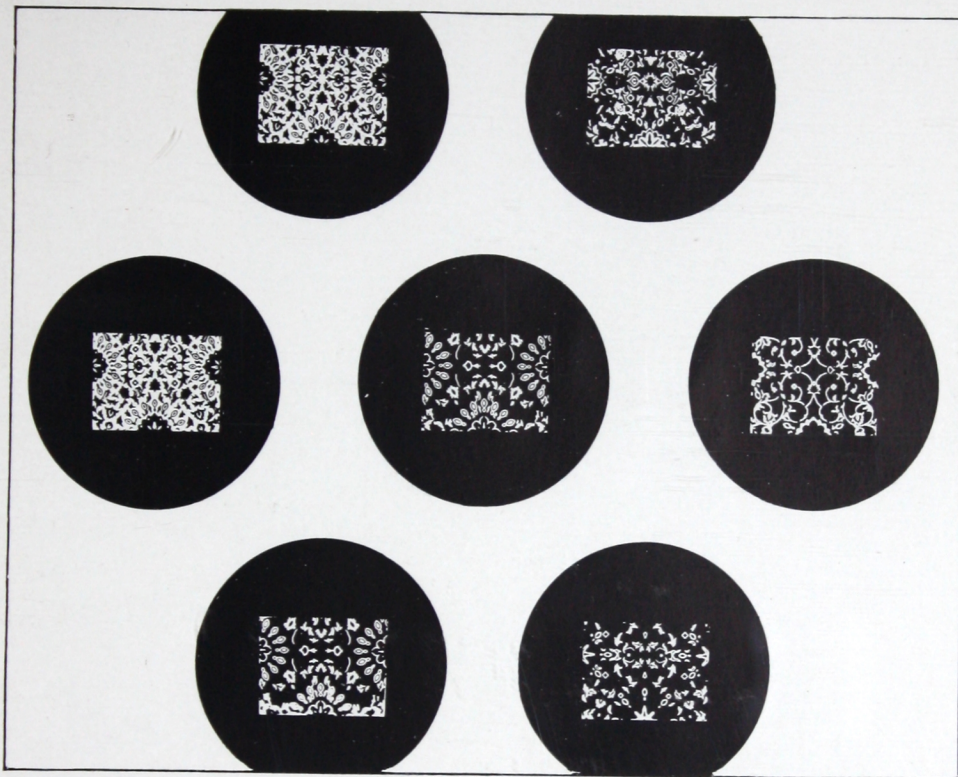


Fig. 5

A negative of a carpet design taken on a  
7-Colour Mutochrome (H. 71)

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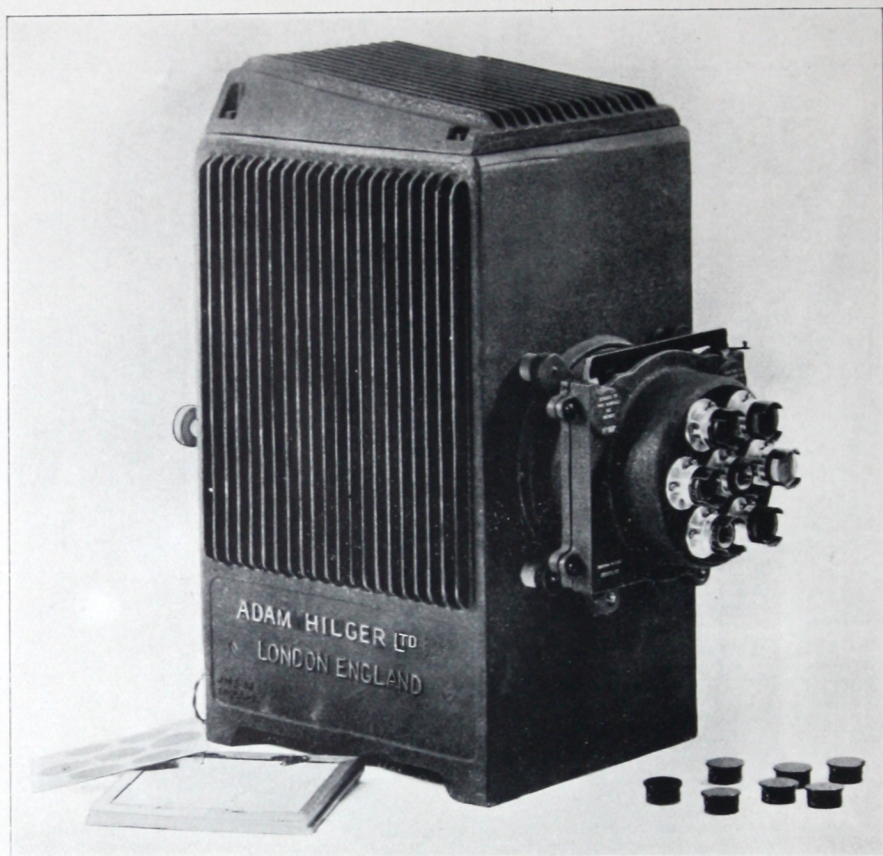


Fig. 6

The 7-Colour Mutochrome (H.71)

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# The Colour Comparator

In all Mutochromes where it is desired to reproduce the colour composition on the material concerned, some little difficulty may be experienced in realising the colours accurately by the pigments. The Colour Comparator has been devised to meet this difficulty. As is shown diagrammatically in Fig. 5, this consists of means by which small pieces of material may be painted or otherwise coloured in whatever way is to be used in the factory, and compared under "Daylight" illumination with the portion of the design under consideration. The painted, printed or dyed specimens are slipped under clips and illuminated by a lamp, corrected to daylight. The colour projected from the Mutochrome is received on a white square of about one half inch side in close proximity to the specimen, and the colours may therefore be matched with accuracy. For price, see enclosed leaflet.

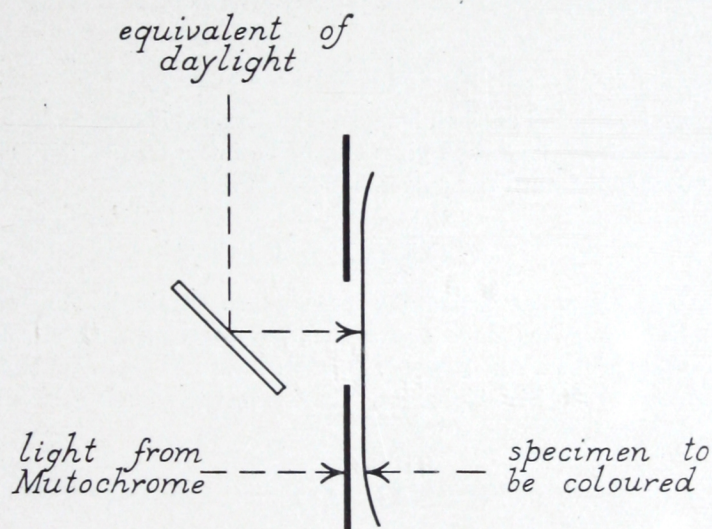


Fig. 7

Diagram of The Colour Comparator.

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# Abridged Instructions for Use

THE FOLLOWING WILL GIVE AN IDEA OF THE PRACTICAL DETAILS  
OF THE PROCESS

## PREPARATION OF DRAWINGS

Where tracings are required, transparent tracing cloth should be used, with ink made from poster black applied to the glossy side.

Where rollers or stencils are already available the patterns may be impressed in black on tracing cloth, white paper, or bristol board, registration marks being made.

## PREPARATION OF NEGATIVES

Commercial Backed Process Plates are used, and full instructions for developer and fixer are printed on the boxes. The exposure depends on the illumination and diaphragm opening, but no difficulty will be experienced in obtaining the correct exposure. The Mutochrome should be placed at the distance from the screen specified on the label.

## PROJECTION

The lamp is adjusted until an image of the filament is seen centrally in each lens. As a precaution dark or smoked glass should be interposed. The dried negative is inserted and adjusted until the patterns mesh on the screen.

## COLORATION

The colour filters are inserted where and as required. The range of colour filters supplied comprises three each of colours covering with small and approximately equal steps the entire range of possible hues and tints, while shades of these can be produced by the iris diaphragm. In this way the whole field of possible colour sensation is covered.

## MATCHING OF COLOURS

When the colour composition is finally approved, the Colour Comparator described above is brought into operation, so that the colours may be transferred accurately to the material concerned.

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*The above instructions are intentionally brief, and full instructions with notes for meeting special cases are sent with each instrument.*

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# P h o t o g r a p h i c      E q u i p m e n t

To ensure that the Mutochrome may be used under the best conditions and with the least delay we supply a complete equipment which includes the following items :

Stand for Mutochrome in varnished oak, fitted with shelves and grooves for negatives.

Wooden screen for photography, on stand.

Lamps on stands for illumination of the drawings or impressions (two lamps are required).

Set of photographic materials, which includes the following items :

4 dozen Backed Process Plates.

Developer (1 Winchester *A* Solution).

Developer (1 Winchester *B* Solution).

2 lbs. of Hypo.

$\frac{1}{2}$  lb. Potassium Ferricyanide.

3 Developing Dishes.

8 oz. Celluloid Measure.

1 Cake Opaque Stopping Medium, with Brush.

We also supply the following items :

Extra Dark Slides, Negative Carriers, Filters and Plates.

---

*For prices of above, see Price List.*

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# CATALOGUE NUMBERS

(For prices, see separate list.)

- H 71.—7 Colour Mutochrome, complete with 400 w. lamp suitable for D.C. or A.C. voltage to suit customer's supply, 1 set of filters, 1 darkslide and 1 negative carrier.
- H 85.—10 Colour Mutochrome, complete with 400 w. lamp suitable for D.C. or A.C. voltage to suit customer's supply, 1 set of filters, 1 darkslide and 1 negative carrier.
- H 68.—17 Colour Mutochrome, complete with 1000 w. lamp suitable for D.C. or A.C. voltage to suit customer's supply, 1 set of filters, 1 darkslide and 1 negative carrier.
- H 121.—25 Colour Mutochrome, complete with 1000 w. lamp suitable for D.C. or A.C. voltage to suit customer's supply, 1 set of filters, 1 darkslide and 1 negative carrier.

(Note.—When ordering, please state voltage of electrical supply.)

## GENERAL SPECIFICATION OF MUTOCHROMES

Cat. No.	Height	Width	Length	Size of Plate	Projection Distance	Size of Picture	Lamp
H 71	1' 8"	11"	1' 6"	5" × 4"	65"	18" sq.	400 w.
H 85	"	"	1' 7"	8½" × 6½"	"	or circle	400 w.
H 68	"	"	1' 8"	8½" × 6½"	"	27" dia.	1000 w.
H 121	"	"	1' 8"	10" × 8"	"		1000 w.

## ENLARGING LENSES

Mutochrome	Complete with mounting for enlarging square of 18" side at 65" to 3' 0" at 130"	Complete with mounting for enlarging square of 18" side at 65" to 5' 0" at 217"
For 7 colour.	H 122	H 123
" 10 "	H 124	H 125
" 17 "	H 126	H 127
" 25 "	H 128	H 129

H 131.—Colour Comparator, suitable for all instruments.

H 132.—Stand in varnished oak, for 7 or 10 colour Mutochrome.

H 133.— " " " 17 " "

H 134.— " " " 25 " "

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- H 399.—Screen, varnished oak and pine.
- F 383.—Lamp, complete with 500 w. lamp.  
*(Note.—When ordering, please state voltage of electrical supply.)*
- F 384.—Extra blue gelatines in frames for lamps.
- F 392.—Set of Photographic materials for 7 colour Mutochrome.
- F 393.—         "         "         "         10 or 17 colour Mutochromes.
- F 394.—         "         "         "         25 colour Mutochrome.
- H 136.—Dark slide for 7 colour Mutochrome.
- H 137.—         "         10 or 17 colour Mutochrome.
- H 138.—         "         25 colour Mutochrome.
- H 139.—Negative Carrier for 7 colour Mutochrome.
- H 140.—         "         "         10 or 17 colour Mutochrome.
- H 141.—         "         "         25 colour Mutochrome.
- H 142.—Filters as required.
- F 386.—Backed Process Plates 5" x 4" for 7 colour Mutochrome.
- F 387.—         "         "         "         8½" x 6½" for 10 or 17 colour Mutochrome.
- F 388.—         "         "         "         10" x 8" for 25 colour Mutochrome.
- F 389.—400 watt Projection type gasfilled lamp, E.S. fitting, 100-130 volts.
- F 390.—         "         "         "         200-260 volts.
- F 395.—500 watt gasfilled lamp, G.E.S. fitting for lamps F 383. 100-130 volts.
- F 396.—         "         "         "         200-260 volts.
- F 397.—1000 watt Projection type gasfilled lamp, G.E.S. fitting. 100-130 volts.
- F 398.—         "         "         "         200-260 volts.
- F 400.—Lamp for Colour Comparator H 131.

*(Note.—When ordering extra lamps, please state voltage of electrical supply.)*

*We have prepared booklets giving particulars of some special-uses of the Mutochrome, and one or more of these will be sent on receipt of particulars as to the proposed use.*

July, 1927.

*Works, Laboratories and Show Rooms:*

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*The GUILD  
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*measures and specifies colour numerically with great accuracy. The measurement serves as a reliable permanent record from which the colour may be reproduced in the instrument at any future time, thus rendering possible accurate colour standardisation and measurement of the stability of colours. The Catalogue Literature of this instrument may be had on application.*



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